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New York Association for Improving the Condition...

Flies and diarrheal disease

New York

[1915?]

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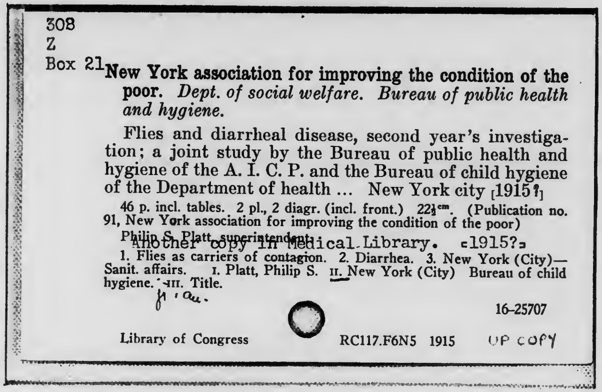

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Philip S. Platt, superintendent.

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FLIES
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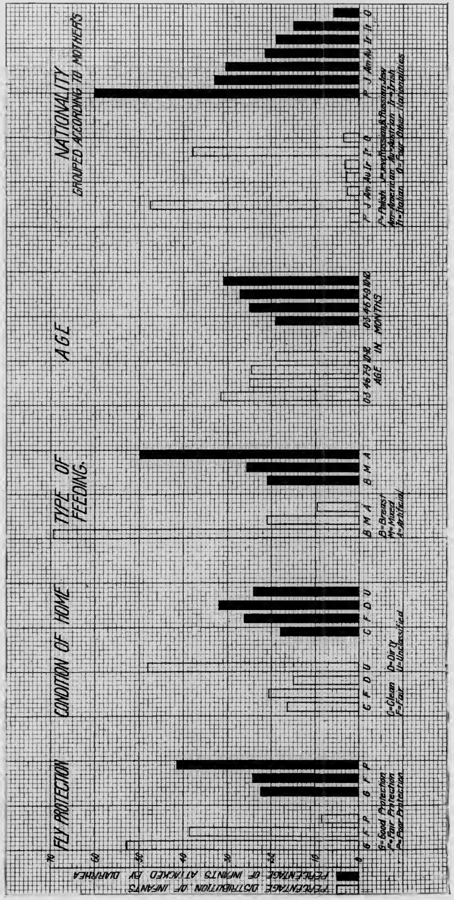
DISEASE

SECOND YEAR'S INVESTIGATION



FIVE FACTORS IN DIARRHEAL DISEASE

Percentage Distribution of Infants and Percentage of Attacks of Diarrhea Distributed According to Fly Protection, Care of Home, Type of Feeding, Age, and Nationality.

Based on Selected Group.

FLIES

AND

DIARRHEAL DISEASE

SECOND YEAR'S INVESTIGATION

A JOINT STUDY BY THE

BUREAU OF PUBLIC HEALTH AND HYGIENIE

OF THE

A. I. C. P.

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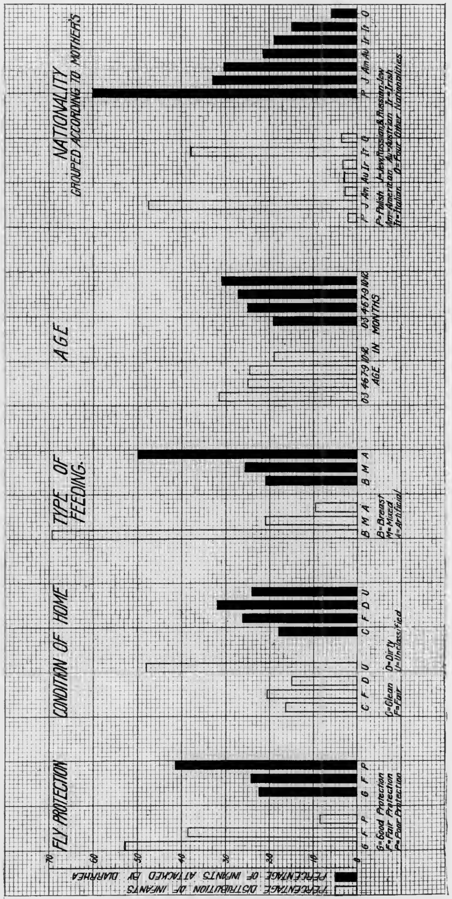
INTENTIONAL SECOND EXPOSURE



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The New York Association for Improving the Condition of the Poor
105 East 22nd Street
New York City

Publication No. 91

1914 ?

THE NEW YORK ASSOCIATION FOR IMPROVING
THE CONDITION OF THE POOR

CORNELIUS N. BLISS, Jr., President
BAILEY B. BURRITT, General Director

BUREAU OF PUBLIC HEALTH AND HYGIENE

OF THE

DEPARTMENT OF SOCIAL WELFARE

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PHILIP S. PLATT, Superintendent

Dec 3 1915 MS

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FOREWORD

This study was made jointly by the Department of Health of New York City and the Bureau of Public Health and Hygiene of the New York Association for Improving the Condition of the Poor. It is one more example of the effective co-operation of public and voluntary activities in attacking a common social problem.

Social-sanitary problems may be approached from several angles. On one hand lie the accepted theories of the day and the strongly expressed statements of the propagandists. On the other hand, highly specialized methods of statistical analysis offer the most precise and accurate measurements that can be made. Since such studies demand a very special mathematical technique they are necessarily few in number. A third source of information is illustrated by this report. Dealing with fairly large numbers under careful control this method of analysis while not pretending to extreme accuracy can furnish conclusions of very significant value. It is to such a study that we commonly look for direction and justification in our extensive social and sanitary welfare work. The need of subjecting opinions on such a popular question as the importance of flies in transmitting disease, to the critical test of careful investigation before effective social action can be taken, is apparent. This report is submitted in the hope that the contribution it makes to present day knowledge regarding the relationship between flies, dirt, feeding and diarrheal disease among infants will make possible more intelligent and efficient social efforts to reduce the amount of sickness and death from such diseases among children.

Throughout the study the Bureau has received from many sources most generous and helpful advice. Without the generous assistance of the Bureau of Child Hygiene of the Health Department in providing the services of six of the nurses, the size of the study would have been greatly curtailed and its value correspondingly diminished. To all who have assisted and especially to Dr. William H. Park, Director of the Health Department Laboratories, the Bureau wishes to express its appreciation.

THE PROBLEM

Method of Attack and Conclusions.

Is the house fly the chief carrier of diarrhea to New York's babies, or has it more deadly rivals? Should some of the energy now expended in fly swatting be diverted to other details of home hygiene, or should the hue and cry after this insect pest be redoubled in volume? Do the fly-exposed infants suffer more than the infants in dirty homes, or than infants who are artificially fed?

An answer to these important questions has been sought in a two-years' study in the homes of more than a thousand infants, the first year's work having been reported in Bulletin 79.

In this, the second year's experiment, the infants were divided into two similar groups and were visited every five days by twelve nurses. The fly-exposed, "control" cases received all the instruction usually given in child hygiene work but no special emphasis was laid on protection against the house fly. In the protected group, on the other hand, in addition to the instruction given the first group, great emphasis was laid on the screening of the baby; in the cradle, go-cart, on the bed and even in the arms, constant use of netting was insisted upon. Over one thousand yards of netting were distributed among the protected families. Effective fly literature, distribution of fly paper and special instruction by the supervisors were other means of reaching the families in which protective measures were taken. Accurate records of the health of the infant, the use of netting, feeding methods and other pertinent information were made at each visit. Analysis of some eighteen thousand records was made from the point of view of fly protection or exposure, home sanitation, feeding methods, nationality, age and atmospheric conditions of temperature and humidity.

The conclusions indicate clearly the relative importance in infant welfare of flies, dirt, and artificial feeding as determined by this study. Furthermore, the importance, in infant hygiene of each condition in itself is strongly established. In baby welfare work none can be neglected.

CONCLUSIONS.*

Fly Factor 1.9

Almost twice as many infants (1.9) had diarrhea among fly-exposed as among the fly-protected infants.

"Dirt" Factor 1.8

The group of influences, associated with a dirty home, and designated as the "dirt" factor, play a similar part in diarrheal incidence among infants. Almost twice as many infants (1.8) had diarrhea in dirty homes as in clean homes.

Artificial Feeding Factor 2.4

Of somewhat greater importance is the influence of artificial feeding. Almost two and a half times as many infants (2.4) were attacked by diarrhea among the artificially fed as among the breast fed infants. If the milk had not been selected and instruction in feeding given in many cases, this difference would have been still greater.

Flies and "Dirt" Factor 2.4

The influence of flies and "dirt" combined is of similar importance to that of artificial feeding. Almost two and a half times as many fly-exposed infants (2.4) in dirty homes were attacked by diarrhea as fly protected infants in clean homes.

"Dirt" and Artificial Feeding Factor 3.5

The influence of "dirt" and artificial feeding combined is still greater. Three and a half times as many artificially fed infants (3.5) in dirty homes were attacked by diarrhea as breast fed infants in clean homes.

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*Based on work of Selected Nurses. (See pages 17-19.)

FLIES AND DIARRHEAL DISEASE.

By

Philip S. Platt, Superintendent

Bureau of Public Health and Hygiene.

The influence of flies in causing diarrhea among infants under one year of age in New York City, with special reference to the sanitary condition of the home, type of feeding, and the age of the infant, is the subject of the following report.

The Need

The problem is one in which loose reasoning and easy assumptions have been the rule rather than the exception. The propagandist has made much of extreme and unreliable statements. Little if any serious attempt has been made to measure the effect upon the fly problem of such important influences as the sanitary condition of the home, type of feeding and the like. The fly has often been given the credit of the combined influence of these several factors. Is the fly as important in clean homes as in dirty homes? What is the influence of flies and "dirt" combined? Such questions are fundamental to any study of the fly. Relative sanitary values are of the utmost importance.

Especially in the North

We know of course that there are sanitary problems peculiar to one climate that are insignificant in other climates. The hookworm, yellow fever, and sleeping sickness, for instance, are diseases only slightly if ever encountered in the northern climates. The fly in its very nature as an insect-carrier of disease is more or less important according as conditions are favorable or unfavorable for the growth of the insect and opportunity for access to the bacteria of intestinal origin is considerable or slight. While there is every reason to believe that the importance of the fly as a carrier of disease is not the same in a well-sewered northern city as in southern cities and towns with greater prevalence of open privies and longer fly season, there have been to our knowledge no properly controlled fly experiments in the northern cities. If the health officers in the north are to determine accurately what results can be accomplished with the resources at their disposal there is an ever greater need of carefully controlled measurements of such sanitary problems as the importance of the fly. Without a sense of proportion regarding sanitary values, an indictment against the fly whether light or heavy is of dubious significance.

Purpose

It was with the intention of determining the influence of the fly under these carefully controlled northern conditions that the Bureau of Public Health and Hygiene devoted the summer of 1914 to an intensive study in the homes of over a thousand infants.

Previous Study

The subject is not one with which the Bureau is unfamiliar. The previous summer (1913) was likewise devoted to a study of the relationship between flies and diarrheal disease. In this experiment, while three times as much diarrhea occurred among those of all ages in a fly-exposed, unsanitated area as in a fly-protected, cleaned-up area, no attempt was made to isolate or measure the several influential factors and the results consequently were not accredited to the fly alone. Recognizing the preliminary nature of this study and the need of substantiation by more delicate methods and more careful control, the present experiment was planned. While the period of observation was from June 9 to September 15, the period covered from the time the plans were laid until the preparation of the report was a full year.

I.—PLAN OF STUDY.

1.—Census.

Size

A frequent criticism of social investigations is justly made upon the grounds of the smallness of the numbers involved. In order to meet this criticism, an endeavor was made to conduct this experiment on as large a scale as the possibility for thorough work permitted. Happily, the size of the experiment was further augmented by the fact that it was conducted jointly by the Department of Health and the Association for Improving the Condition of the Poor. In view of the direct importance of the study upon the problems of infant welfare in New York, the Health Department gave the services of six of the Department Milk Station nurses, who were able, however, to combine their own work with that which our study involved. Six nurses employed by the Bureau, brought the number to twelve. Estimating that 100 visits a week should be made, a census of 1,200 homes containing an infant under one year of age was planned.

Health Depart- Nurses

A. I. C. P. Nurses

Selection of Districts

The selection of the districts in which to make the study was given careful consideration. In order to make the study representative of more than one nationality, and get a racial balance, Jewish, Italian, and Irish districts, with uniformly high population congestion and diarrheal rates, were chosen. Two contiguous downtown districts, consisting mainly of Italian and Jewish families and bounded by Water, Henry, James and Montgomery Streets were selected. An uptown district on the West Side, bounded by 46th Street, 54th Street, 9th Avenue and the Hudson River, was largely of Irish nationality. Of course, the districts are by no means of single nationality and infants were not excluded because of other nationality than the one predominating.

Census

In these three districts the canvass for the 1,200 infants under one year of age was begun on June 9, and lasted until June 21. A census card had been prepared upon which full data regarding the condition of the home, of the family, and of the infant were recorded. Special emphasis was laid on the care of the child and the willingness to co-operate in special measures, such as screening of baby and food, covering of diaper can, etc., the replies being properly graded so as to indicate the degree of co-operation which might be expected. Such social data as age, nativity, time in United States, previous history of the family, sickness, deaths and present conditions of health were also recorded.

Division of Census

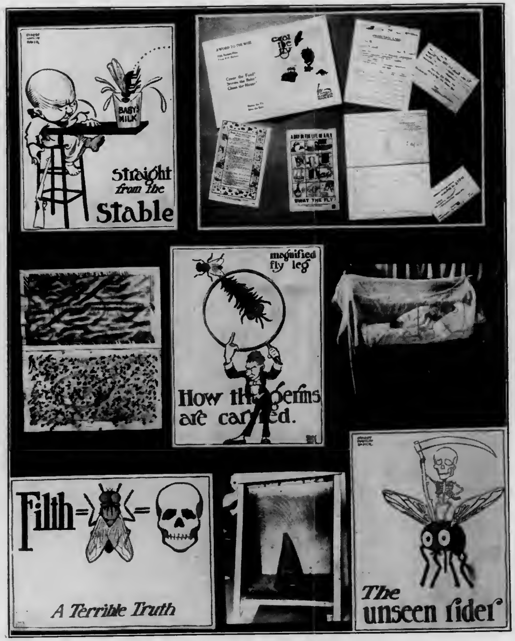
The analysis of these census cards showed 1153 homes with 1165 infants under one year of age, and a total of 2130 children under 5 years distributed almost equally in the three districts. These, of course, were divided at once into two groups as nearly identical as possible. In one group the special fly-protective measures were to be enforced; in the other group the absence of such measures would enable it to serve as a "control". Great pains were taken to make the two groups entirely comparable. Many conditions were taken into consideration in this division; namely, the size of the family, the care of the infant, the promise of future co-operation, the possession of fly netting for the baby's protection, and the presence of sick or delicate children, of which there were 6%. After division, the districts were practically identical in all these respects. These infants were then distributed equally among the twelve nurses on the basis of their familiarity with the people or the language of any district.

2.—Description of Protective Measures.

Screening of Windows not Attempted

The group to be protected against the fly has been mentioned. Immediately the question arises as to the nature of the protection. At first thought, screening of windows occurs as the chief if not only protective measure of importance. It was upon this point that the experience gained in our study of the previous summer was of very practical value. For the women of the lower East Side, a window possesses an importance of the first magnitude, and the suggestion of screening a window in such a way as to curtail ever so slightly its important social function will not readily be entertained. Even sliding screens, the installation of which amounts to a very considerable sum, were found to be quite impracticable. However, even if the screens were properly used and cared for, the influence which they would exert on the children from one to five, who are so largely in the streets and eating all kinds of street food, is probably not great. Consequently, it was decided that no attempt would be made to protect the child from 1 to 5 years of age, but that every effort should be concentrated on the infant under one year of age. The infant in its carriage or its go-cart, cradle, or bed can be effectively protected against the fly by the proper use of netting. It was upon

Netting Over Baby



THE SINEWS OF WAR AGAINST THE FLY
Specimens of Illustrated Circulars, Netting, Fly Paper, Traps and Inspection Cards used During the Summer.

this that the greatest emphasis was laid. The insistent demand was that the netting must be over the baby. In order that there would be no tax upon the slim resources of these families, the Bureau provided the netting. About 1000 yards of netting were thus distributed.

Fly Literature

In addition to the distribution and use of netting, five different types of popular fly literature, effectively illustrated, were placed in these homes. Tanglefoot fly paper, generously contributed by an interested firm, was distributed each week, chiefly as a means of further fixing attention on the fly. Of course, the visiting of the nurses was of the greatest importance, not only because of the necessity of recording the conditions existing in the home each week, but also to give the stimulus, encouragement and advice to keep up the interest and enthusiasm of the mother.

Fly Paper

Nurses' Visits

Control Group

On the other hand, in the so-called unprotected or "control" group, the special measures with which the fly was combatted, were not emphasized. Netting, literature, and fly paper were not distributed, though the nurses made an equal number of visits. In making these visits the nurses while not dwelling upon the fly, observed all the conditions existing in the home and gave the usual sanitary and hygienic instruction customary to the Health Department nurses. Of course, when any case of sickness was discovered, regardless of the group, every effort was taken to restore the sick one to health. Children with diarrhea were sent to the milk stations for further diagnosis and treatment.

Inspection Cards

The information gathered by the nurses at each visit was recorded on an inspection card provided for that purpose. The nurses were required to record information concerning the health or the sickness of the children under five years of age, the use of netting over the baby or the go-cart, the exposure of food, the prevalence of flies in the rooms, the use of fly paper, the method of feeding, the handling of the milk, etc. It was upon these reports of the nurses that the final classification of the infants was made.

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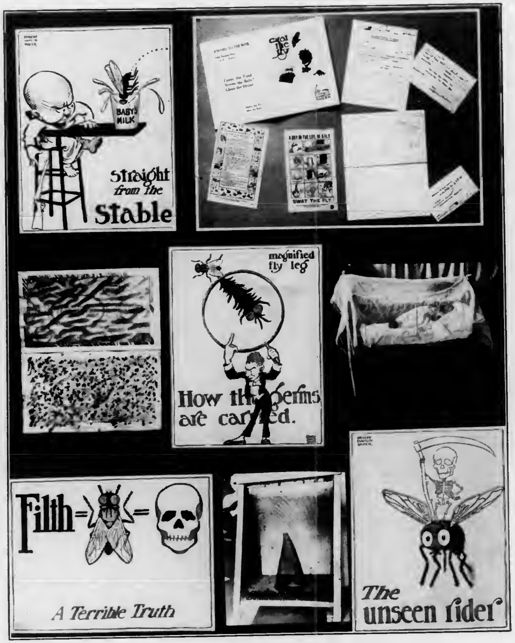

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Supervisors

In addition to the visits of the twelve nurses, each of the three districts was under the constant observation of a supervisor who visited the protected homes, delivering fly paper, reporting conditions as found and checking up the reports of the nurses.

II.—PLAN OF ANALYSIS OF STUDY.

Number of Cards

At the close of the field work on September 15, the files contained some 18,000 observations upon some 1200 infants. Included in these were several hundred regarding whom there were insufficient reports, owing almost entirely to the removal of the families from the neighborhood. As many as 200 cases were thus dropped. Those remaining had a minimum of eight visits and all had been under observation at least two months. It was the rule, however, that whenever a family moved and was consequently lost, another family with an infant under one year of age should be found to take its place. This prevented the number from being too markedly reduced.

Dropped Cases

Classification

Early in the experiment it became evident that the division of 1200 families into two similar groups, one in which the infant was protected against flies and the other in which flies were disregarded, created too arbitrary and inelastic a distinction to be successful. Within any group of such dimensions there must be allowance for individual variation. Within the protected group the best and the poorest degrees of co-operation were found, and in the "control" group there were to be found those who were protecting the infant against the fly in a thoroughly creditable manner. Our observation in the matter was later substantiated by comparison of the diarrheal rates expressed in terms of the percentage of infants attacked by diarrhea, for the two groups. The protected group as such had a rate of 22.5%, while the "control" had a rate of 20.5%—a result which gives little encouragement to the idea that real co-operation can be expected throughout a large group.

Method of Classification

It was realized, of course, that the classification of each infant according to its particular degree of fly protection must be done with the greatest care and accuracy, else the results of the experiment would be of little worth. A method which allowed a maximum degree of reliability and the minimum of error was found. Upon the basis of the percentage of actual observations of netting over the baby, the netting efficiency and the degree of protection of the infant could be classified without depending upon any unstandardized personal impressions. The only ground for criticism exists in deciding what percentage of observations should determine good fly, fair fly, and poor fly protection. In view of the many conditions which in themselves made it impossible that the netting should always have been over the infant, such as during feeding, bathing, or while in its most active waking period, it is obvious that the netting could not always have been observed, even though the best protection was practised. After careful consideration 40% or greater of positive observations was decided upon as the range for good protection, between 10% and 40%, fair protection, below 10%, poor protection. In this way it is believed an accurate classification has been obtained.

Fly Protection

Condition of Home

Similar methods were used in classifying the infants according to the sanitary condition of the home, and type of feeding. By the very nature of the groups, however, the classification of the clean, fair and dirty homes cannot claim the same degree of reliability as is claimed for the fly-protection groups. In the first place, the judgment of the nurses necessarily played a large part, and such judgments do not allow of the most careful standardization. Futhermore, for various reasons a weekly observation on this point was not demanded, and the classifications are based chiefly on a general summary of the home conditions, provided by the nurses towards the close of the experiment, amplified by the detailed statement on the census card, the information frequently given voluntarily by the nurses, and the impressions of the supervisors. Where the information was considered insufficient the card was placed in the

Type of Feeding

unclassified group. Infants were classified as breast fed or artificially fed when 80% or more of the observations of the nurses were so recorded. Where the percentage was lower than 80%, as for instance, when 50% were breast, 30% artificial and 20% mixed, the case was classified as a mixed feeding case.

Age

Nationality

Age and nationality were two further sub-classifications. The age of the infant is that given by the mother at the time the census was made. The nationality of father and mother, due to the extensive international marriages, is frequently not the same. The policy of determining the nationality of the off-spring by the nationality of the mother, which has been used by the United States Census Bureau, is here employed.

Tabulation by Weeks

After each infant had been classified according to the groups before mentioned, all the information recorded by the nurses during the twelve weeks of visiting was transcribed in such form as to give a complete history of the condition of the experiment week by week. The weekly observations regarding netting over baby, and over go-cart, the type of feeding, exposure of milk, prevalence of flies and condition of the infant were summarized. The comparative efficiency of observation of the nurses could then be noted.

Tabulation of Sub-classes

From these large tabulation sheets the complete data regarding the infants were arranged in the various sub-classifications. This necessitated the preparation of 144 tables. The value of the method lay in the fact that any combination of groups could then be made with ease.

Sickness

Particular care was taken with the reports of sickness. These were carefully reviewed and correctly classified by Dr. Anna von Sholly of the Health Department, under whose immediate control were the nurses during the field study. Diarrheal cases were separated from the non-diarrheal. Where second or third attacks of diarrhea were reported as occurring in the same child during the summer, the separateness of the attacks was established as carefully as was possible. In the majority of cases two weeks or more intervened between any two attacks, with a report of "well" following the first attack.

The recurrence of attacks of summer diarrhea, however, is a matter upon which it is felt, in the light of our present knowledge, no important interpretive conclusions should be based.

TABLE A
SOCIAL DATA.

Number and Percentage Distribution of all Infants in Fly Study.

Degree of FLY PROTECTION	Tot. No. Inf.	% of Inf.	No. visits made	Aver. No. visits per Inf.
Good	416	45.2	4854	11.7
Fair	412	44.7	4407	10.7
Poor	93	10.1	1033	11.1
Total	921	100.	10294	11.2

Sanitary CONDITION OF HOME	Total No. Inf.	% of Inf.
Clean	204	22.2
Fair	220	23.9
Dirty	131	14.2
Unclassified	366	39.7
Total	921	100.

TYPE OF FEEDING	Total No. Inf.	% of Inf.
Breast	636	69.0
Mixed	182	19.8
Artificial	103	11.2
Total	921	100.

AGE in Months	Total No. Inf.	% of Inf.
0—3 Months	279	30.3
4—6 "	232	25.2
7—9 "	240	26.0
10—12 "	170	18.5
Total	921	100.

NATIONALITY (According to mother's)	Total No. Inf.	% of Inf.
American	125	13.6
Austrian	19	2.6
English	9	1.
German	25	2.7
Greek	10	1.1
Italian	283	30.8
Irish	100	10.9
Jew	308	33.4
Polish	15	1.6
Eight Other Nationalities	27	2.9
Total	921	100.

When analysis of the corrected flies was made, the number of infants comprising the study stood at 921. Table A shows the number and percentage of distribution of these infants according to degree of fly protection, sanitary condition of home, type of feeding, age and nationality. It will be noted that about 45% enjoyed good fly protection, 45% fair (medium) and 10% poor fly protection. The latter per cent. is smaller than would be desired but the fact that it is smaller shows in an interesting way that even though for experimental purposes one might desire it otherwise, only 10% (and of these only a little over one-half came from the original "control" group) of such a population will totally neglect to protect the infant from flies. Again, in regard to the sanitary condition of the home, we have two-thirds fewer dirty homes than either clean or fair (medium) homes. Unfortunately, a large group had to be left unclassified, owing to conflicting or insufficient data on the question. However, this unclassified group does not contain a disproportionate number of any sub-group, as artificially fed, or poorly-protected infants.

Fly Protection

Condition of Home

Type of Feeding

The marked preponderance of breast fed infants conforms to the usual findings among such classes. The percentage distribution of the three types of feeding remains very constant in all sub-groups except that of age, in which of course the percentage of artificially fed infants increases with age.

Age

When age is considered, we find a gradual decrease in number as the age increases; to wit, 30% in the 0—3 months group, 25% in the 4—6, 26% in the 7—9, and 19% in the 10—12.

Nationality

On account of the large extent of international marriages, it became necessary as before stated to classify the infants according to the mother's nationality. Some liberty has been taken, perhaps, in combining infants of Jewish, Russian-Jewish, and Russian mothers. As combined, however, they represent the largest group, 33%. Next comes the Italian 31%, the American and Irish follow with 14% and 11% respectively. Sixteen nationalities in all are represented.

The Separation of the Nurses into Two Groups.

Unfortunately, in an experiment of this nature, the quality of the work performed by a number of nurses is not likely to be of exactly the same standard. Close association with and careful supervision of the nurses necessarily gave the supervisors definite impressions in regard to the character and quality of their work. Feeling that the standard of accuracy of the study demanded a careful consideration of the possible unreliability of the work of some of the nurses, they were eventually divided by the supervisors into two groups designated as Selected Nurses and Non-selected Nurses, and thereafter kept entirely separate. Each group consisted of three Bureau and three Health Department nurses. The separation was made at the close of the experiment, before any analysis of results was begun, and was based on the following observations of the supervisors:

Reasons for Separation of Nurses

1. The non-selected nurses were less interested in the experiment than the selected nurses.
2. They were less willing and conscientious in following instructions.
3. Throughout the field work it was observed that the information on their inspection cards was considerably less complete, having often to be returned because of the omission of important information.
4. When these nurses took their vacations, considerably more time was lost in putting substitutes in their places.

Reasons Substantiated

When a mathematical comparison of the actual work of the two groups of nurses was made, the results fully substantiated the general impression of the nurses.

The non-selected nurses made,

a. By less thorough work

1. Fourteen per cent. or 1.7 fewer visits to each infant than the selected nurses.
2. Thirteen per cent. or 590 fewer observations in regard to the prevalence of flies.

Upon this evidence it must be admitted either that the selected nurses were overzealous or that the work of the non-selected nurses was materially less reliable.

b. By discordant results

Having reached by direct observation and mathematical measurement an opinion regarding the relative reliability of the work of these nurses, comparison of the diarrheal rates of the selected and non-selected nurses revealed the following facts:

1. The difference in the percentage of infants attacked by diarrhea and the percentage of attacks of diarrhea, as found among the selected and non-selected nurses, is considerable, the rates for the non-selected being lower in every instance. When the entire non-selected group is considered the differences in rates for infants attacked by diarrhea and for attacks of diarrhea are 9 and 10 respectively, or 36% and 33% lower than those of the selected group.
2. The diarrheal rates for the three degrees of fly protection among the non-selected nurses are insistent and unintelligible in the light of the selected nurses' rates. The most striking variation from what might be expected is in the poorly protected group where—as may be seen from tables on pages 20 and 35—the differences in the diarrheal rates are 18 and 29, or 44% and 54% less than the selected group. The most detailed study within this group on the grounds of feeding, age, nationality, sanitation of home, and fly exposure, fails to explain the extreme variation.

Districts Similar

In view of the lower rates of the non-selected nurses, the question arises whether the districts visited by these nurses were healthier. Such a situation is conceivable, although the probability of such being the case is not great. There is no a priori reason for so thinking. The three districts in which the experiment was conducted were chosen for their high states of congestion and high diarrheal mortalities, and the twelve nurses were distributed according to their familiarity with the language or the people of the district.

Conditions Less Favorable for Non-Selected

On the other hand, judging by such criteria as is at hand, the evidence is that the infants under the care of the non-selected nurses should be less rather than more healthy. For example, more milk was reported as exposed (3%), while "few flies" were reported less frequently (18%), and "many flies" more frequently (5%). Netting was found in use 7% less often and the percentage of infants in the poor protection groups was somewhat greater, 12% among the non-selected group as compared with 8% among the selected.

Differences in Nationality Rates

When, moreover, the diarrheal rates for infants of the same nationality, often living practically side by side, under the care of the two groups of nurses, are compared, a marked variation is found. The rates of the four largest nationality groups composing 91% and 85% of the infants of the selected and non-selected groups, respectively, follow:

	Selected	Non-selected
American	31.	11.
Jew, Russian and Russian Jew	33.	25.
Irish	19.	13.
Italian	15.	15.
Rates for above 4 nationalities	25.	15.

Primary Conclusions on Selected Nurses

These discrepancies further substantiate the opinion regarding the non-selected nurses, previously determined by the quality and quantity of their work and their interest in the experiment, and would seem to justify the exclusion of their work from equal consideration with the selected nurses' work. In determining, however, what emphasis should be given the work of these nurses, the Bureau decided that while the work of the selected nurses warranted separate interpretation and special emphasis, the results obtained by the selected, the non-selected, and the combined nurses should be fully presented and that modified conclusions be drawn if necessary from the combined results.

Modified Conclusions on All Nurses

RESULTS.

Discussion of Tables of Selected Nurses.

Results of Selected Nurses

The results of the study based upon the work of the selected nurses must be expressed primarily in terms of the percentage of infants attacked by diarrhea. By comparing the percentages of two contrasted groups the influences in question may be measured.

TABLE I.—SELECTED NURSES.

FLY PROTECTION.

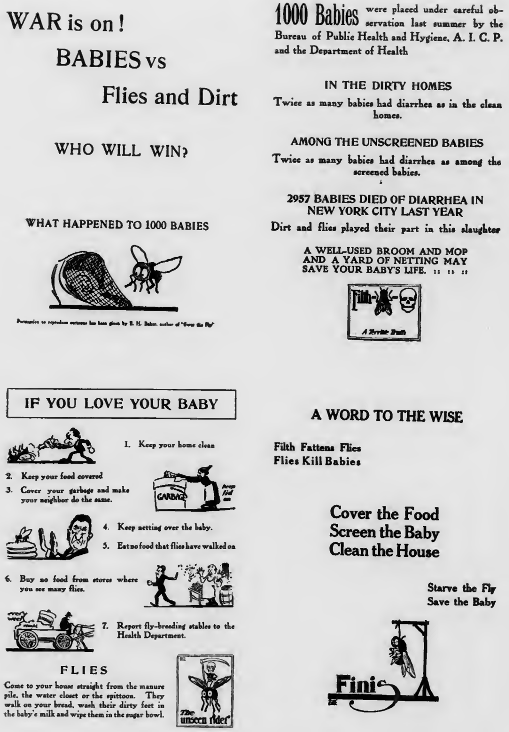
	Total No. Infants.	% Distri. Infants.	Inf. Attack. by Diar. No.	Inf. Attack. by Diar. %	Attacks of Diar. No.	Attacks of Diar. %
Good Protection	254	53.	57	22.	66	26.
Fair Protection	185	39.	45	24.	56	30.
Poor Protection	41	8.	17	41.	22	54.
Total......	480	100.	119	25.	144	30.
Fly factor..............................				1.9		

By reference to Table I, Selected Nurses, it will be noted that 22% of the infants in the good protection group had diarrhea, and 41% of the infants in the poor protection group. The method of measuring the influence of flies is that of dividing 41% by 22%, whereby we have a factor (1.9) telling how much greater was the diarrheal rate in the one condition than in the other. **It may be said then that almost twice (1.9) as many infants had diarrhea among the fly-exposed group as among the fly-protected group.**

Fly Factor 1.9

Importance of Contributing Influences

It will be natural to inquire at this point whether the diarrheal rates which are given for the good, fair or poor fly protection groups are really exclusively attributable to the protection, or whether other influences such as dirty homes, or artificial feeding may not be largely responsible for the high rate found, for instance, in the poor protection group. This question was examined with care, and the tests applied indicate that while occasionally a slight correction may be necessary, as a rule, especially in the measurements of the main factors, other conditions do not influence the results sufficiently to affect the conclusions. It is obvious that the size of the experiment does not permit the use of highly specialized statistical methods by which every contributing influence can be accurately measured, but by the available methods, namely, the elimination of any condition, such as artificial feeding, from the good protection and the poor protection groups, assurance may be had that the factor is not appreciably altered. While it is impracticable to discount the age influence in every case, it appears from careful scrutiny of the sub-groups that the age factor is not of such importance as materially to affect any con-



WAR is on!

BABIES vs

Flies and Dirt

WHO WILL WIN?

WHAT HAPPENED TO 1000 BABIES

Permission to reproduce cartoons has been given by E. H. Baker, author of "Swat the Fly"

IF YOU LOVE YOUR BABY

1. Keep your home clean
2. Keep your food covered
3. Cover your garbage and make your neighbor do the same.
4. Keep netting over the baby.
5. Eat no food that flies have walked on
6. Buy no food from stores where you see many flies.
7. Report fly-breeding stables to the Health Department.

FLIES

Come to your house straight from the manure pile, the water closet or the spittoon. They walk on your bread, wash their dirty feet in the baby's milk and wipe them in the sugar bowl.

1000 Babies were placed under careful observation last summer by the Bureau of Public Health and Hygiene, A. I. C. P. and the Department of Health

IN THE DIRTY HOMES

Twice as many babies had diarrhea as in the clean homes.

AMONG THE UNSCREENED BABIES

Twice as many babies had diarrhea as among the screened babies.

2957 BABIES DIED OF DIARRHEA IN NEW YORK CITY LAST YEAR

Dirt and flies played their part in this slaughter

A WELL-USED BROOM AND MOP AND A YARD OF NETTING MAY SAVE YOUR BABY'S LIFE. :: :: ::

A WORD TO THE WISE

Filth Fattens Flies
Flies Kill Babies

Cover the Food
Screen the Baby
Clean the House

Starve the Fly
Save the Baby

A CONTRIBUTION TO FLY CAMPAIGN LITERATURE

The Results of the Study Popularized for General Distribution

clusions. It should be considered also that the summer had no intensely hot periods and that there was some supervision of the food.

When the question of the percentage of attacks of diarrhea is considered in contradistinction to the percentage of infants attacked, the percentage of attacks is found to be 1.8 times greater in fly-exposed than in the fly-protected group.

TABLE II.—SELECTED NURSES.

CONDITION OF HOME.

	Total No. Infants.	% Distri. Infants.	Inf. Attack. by Diar. No.	%	Attacks of Diar. No.	%
Clean	78	16.	14	18.	16	21.
Fair	99	21.	26	26.	34	34.
Dirty	72	15.	23	32.	27	38.
Unclassified	231	48.	56	24.	67	29.
Total	480	100.	119	25.	144	30.
"Dirt" factor				1.8		

"Dirt" Factor 1.8

Significance of "Dirt"

Table II, Selected Nurses, gives the data regarding the sanitary condition of the home, determined as previously described. Here it will be noted that the clean and the dirty homes are in about equal number, but the percentage of infants attacked by diarrhea is markedly different, viz. 18% for the clean and 32% for the dirty homes, or 1.8 times as many "diarrheal" infants in the dirty homes as in the clean homes. The infants in the fair (medium) homes and the large unclassified group occupy an intermediate position. The significance of the so-called "dirt" factor should be carefully considered. Of course, the classification of the homes according to cleanliness or dirtiness is based on the objective appearance of the home. Objectively, a dirty home is one in which the visitor finds the remains of a meal on the table or in the sink, dirty clothes lying about, abundant evidence of dust and dirt, and the general appearance of slovenly housekeeping. Subjectively, a dirty home probably means that the mother is of a careless, easy-going disposition, lacking in pride and satisfied with the minimum standards of decency. Associated with these characteristics, a lack of systematic care of the infant, irregular and improper feeding and other unfavorable influences on the infant are likely to be found. With this in mind, and not before, the significance of the "dirt" factor may be grasped. Probably the dirt itself is of only moderate importance; it is used here only as a symbol of a combination of inferior qualities on the part of the mother, and unfavorable conditions in the home. Obviously, the reverse of these characteristics, objective and subjective, are to be expected in the clean homes.

Importance of Contributing Influences

While the artificially fed infants may be eliminated from the clean homes and the dirty homes without altering the "dirt" factor of 1.8, the same is not strictly true of the influence of poor protection. This, however, is largely owing to the absence of infants in the clean homes of the poor protection group. Had this group of clean homes a normal size and a consistent diarrheal rate, the "dirt" factor would probably be unaffected.

It may be said, however, that almost twice (1.8) as many infants had diarrhea in the dirty homes as in the clean homes. From this it appears that flies and so-called "dirt" are equally important in favoring diarrhea among infants.

When the percentage of attacks of diarrhea are considered, the percentage of diarrheal attacks remains 1.8 times greater in the dirty homes than in the clean.

TABLE III.—SELECTED NURSES.

TYPE OF FEEDING.

	Total No. Infants.	% Distri. Infants.	Inf. Attack. by Diar.		Attacks of Diar.	
			No.	%	No.	%
Breast Fed.....	333	69.	70	21.	85	26.
Mixed Fed.....	101	21.	26	26.	32	32.
Artificially Fed.	46	10.	23	50.	27	59.
Total......	480	100.	119	25.	144	30.
Artificial feeding factor..................				2.4		

Artificial Feeding Factor 2.4

In connection with this table the association of a high percentage of diarrheal infants with artificial feeding will first be noted, the percentage being 50% as contrasted with 21% for the breast fed. **This indicates that almost two and a half times (2.4) as many infants had diarrhea among the artificially fed as among the breast fed.** It also indicates that artificial feeding is more important than either flies or dirt. The artificial feeding factor, based on the percentage of attacks of diarrhea will be seen to be 2.3.

Contributing Influence of Artificial Feeding

It is because of this very considerable importance of artificial feeding that it is essential to determine to what degree this influence figures in causing the high rates attributed to poor protection or dirty homes. In addition to the discussion of this question on page 20, there is another method by which the influence of artificial feeding in determining the other factors may be shown to be necessarily small, so small in fact that it cannot invalidate the results. It will be seen that the artificially fed group is small in number, only 10% of the whole, while the breast fed group constitutes 69% of all the infants. Consequently, if the same proportion existed in all the sub-groups, the influence of artificial feeding, with its higher diarrheal rate could never be large, and it is a fact that the distribution of the artificially fed rarely exceeds 10%, except in the older age groups.

TABLE IV.—SELECTED NURSES.

AGE.

	Total No. Infants.	% Distri. Infants.	Inf. Attack. by Diar.		Attacks of Diar.	
			No.	%	No.	%
0—3 Months..	151	32.	29	19.	34	23.
4—6 " ..	120	25.	30	25.	37	31.
7—9 " ..	118	24.	32	27.	41	35.
10—12 " ..	91	19.	28	31.	32	35.
Total......	480	100.	119	25.	144	30.

Influence of Age

In considering the distribution and diarrheal rates of the infants according to age, an interesting condition is observed. The percentage of infants 0—3 months of age is the largest of the four age groups while the percentage of infants having diarrhea is the lowest. Each succeeding age group has a smaller percentage of infants, and a higher diarrheal rate. The increased influence of artificial feeding with accompanying decrease of breast feeding partially explains this. For instance, although not shown in any of the tables, the percentage of artificial feeding for the four age periods is 3, 7, 14 and 18 per cent. respectively and that of breast feeding 80, 73, 64 and 54 per cent. respectively. With this exception, the distribution of the age groups among other groups may be said to be such as not to give undue weight to the age factor.

TABLE V.—SELECTED NURSES.

NATIONALITY.

(Grouped according to mother's.)

	Total No. Infants.	% Distri. Infants.	Inf. Attack. by Diar. No.	Inf. Attack. by Diar. %	Attacks of Diar. No.	Attacks of Diar. %
American	13	3.	4	31.	4	31.
Austrian	14	3.	3	21.	5	36.
Irish	16	3.	3	19.	3	19.
Italian	182	38.	27	15.	31	17.
Jew	228	48.	75	33.	93	41.
Polish	10	2.	6	60.	7	70.
4 Other Nation.	17	3.	1	6.	1	6.
Total......	480	100.	119	25.	144	30.

Influence of Nationality

Of the six chief nationalities, the smallest group had the highest percentage of children attacked by diarrhea, viz. the Polish with 60%. The next highest rate, 33%, is that of the largest group, viz. the Jewish which constitutes 48% of the total number in the experiment. As has been explained elsewhere, the term Jewish has been used somewhat loosely here, as constituting those whose mothers claimed Jewish, Russian, and Russian-Jewish nationality. The Americans come next in diarrheal rate (31%), although but a small part (3%) of the total number. The Austrian and Irish are next in order, with the Italians, the second largest group (38%) possessing the lowest diarrheal rate (15%). It is felt that great emphasis should not be placed on these nationality rates, with the exception of the Italian and the Jewish. The former are predominatingly clean and well-protected, while the latter, though no less favorably placed as regards feeding are more largely represented in the dirty and poorly-protected groups. Here the figures are sufficiently large to say with some degree of accuracy that the Jewish infants are on the whole less favorably situated than the Italian. In the Jewish group 2.2 times as many infants had diarrhea as in the Italian group.

ANALYSIS WITHIN PROTECTION GROUPS.

Fly protection, condition of home, type of feeding, age and nationality have now been discussed singly. Discussion with reference to the other factors under consideration is possible, however, owing to the method of analysis which was adopted. For example, one may look within the well-protected group and see what conditions of home exist.

TABLE VI.—SELECTED NURSES.

FLY PROTECTION.

ACCORDING TO CONDITION OF HOME.

	Total No. Infants.	% Distri. Infants.	Inf. Attack. by Diar. No.	Inf. Attack. by Diar. %	Attacks of Diar. No.	Attacks of Diar. %
Good Protection.						
Clean	55	22.	10	18.	10	18.
Fair	55	22.	13	24.	17	31.
Dirty	28	11.	7	25.	7	25.
Unclassified	116	45.	27	23.	32	28.
Total......	254	100.	57	22.	66	26.
"Dirt" factor..............................				1.4		
Fair Protection.						
Clean	22	12.	4	18.	6	27.
Fair	39	21.	11	28.	14	36.
Dirty	26	14.	8	31.	9	35.
Unclassified	98	53.	22	22.	27	28.
Total......	185	100.	45	24.	56	30.
"Dirt" factor..............................				1.7		
Poor Protection.						
Clean	1	2.	—	—	—	—
Fair	5	12.	2	40.	3	60.
Dirty	18	44.	8	44.	11	61.
Unclassified	17	42.	7	41.	8	47.
Total......	41	100.	17	41.	22	54.
"Dirt" factor..............................						
Good, Fair and Poor Protection.						
Clean	78	16.	14	18.	16	21.
Fair	99	21.	26	26.	34	34.
Dirty	72	15.	23	32.	27	38.
Unclassified	231	48.	56	24.	67	29.
Total......	480	100.	119	25.	144	30.
"Dirt" factor..............................				1.8		

Fly Protection and Condition of Home

Table VI, Selected Nurses shows the distribution and the two diarrheal rates for each type of home under the three degrees of fly protection. It will be noted that the percentage of infants in the clean homes is large under good protection and small under poor protection, while the reverse is true for percentage of infants in dirty homes. At the same time, the percentage of infants attacked by diarrhea within each protection group shows ascending rates according as the home conditions become unfavorable. Also, a marked increase of rates for similar conditions of home is observed when the various degrees of protections are compared. There is a marked consistency in the increasing rates among these twelve classifications with the exception of the poor protection, clean homes group, which is so small as to be negligible. The consistency of the increasing rates for the attacks of diarrhea is scarcely less striking.

Flies and "Dirt" Factor 2.4

The fly factor and the "dirt" factor, which have been discussed singly, may here be studied together. For instance, the diarrheal rate (41%) for the poor-protection-dirty-homes group may be compared with the rate (18%) for the good-protection-clean-homes group. This **gives a factor for flies and "dirt" combined of 2.4, a measurement which is the same as that of artificial feeding.**

Unfortunately, the plan to measure the relative importance of the insanitary condition of the home under good, fair, and poor fly protection as well as to obtain fly factors for clean, fair, dirty and unclassified homes, had to be given up owing to the smallness of many of the groups involved. While unwilling to give to such measurements the definiteness of figures, it may be stated that the work of the selected nurses shows a consistently increasing importance of the conditions generally accepted as unfavorable in the diarrheal problem. For instance, the fly factor is obviously greater in the dirty homes than in the clean; and the "dirt" factor in the poor protection group, though it cannot be determined, gives indication of being greater than the "dirt" factor in fair or clean homes.

TABLE VII.—SELECTED NURSES.

FLY PROTECTION.

ACCORDING TO TYPE OF FEEDING.

	Total No. Infants.	% Distri. Infants.	Inf. Attack. by Diar. No.	Inf. Attack. by Diar. %	Attacks of Diar. No.	Attacks of Diar. %
Good Protection.						
Breast Fed.....	180	71.	36	20.	43	24.
Mixed Fed.....	51	20.	11	22.	11	22.
Artificially Fed.	23	9.	10	43.	12	52.
Total......	254	100.	57	22.	66	26.
Feeding factor..........................				2.2		
Fair Protection.						
Breast Fed.....	131	71.	26	20.	31	24.
Mixed Fed.....	34	18.	9	27.	13	38.
Artificially Fed.	20	11.	10	50.	12	60.
Total......	185	100.	45	24.	56	30.
Feeding factor..........................				2.5		
Poor Protection.						
Breast Fed.....	22	54.	8	36.	11	50.
Mixed Fed.....	16	39.	6	38.	8	50.
Artificially Fed.	3	7.	3	100.	3	100.
Total......	41	100.	17	41.	22	54.
Feeding factor..........................				2.8		
Good, Fair and Poor Protection.						
Breast Fed.....	333	69.	70	21.	85	26.
Mixed Fed.....	101	21.	26	26.	32	32.
Artificially Fed.	46	10.	23	50.	27	59.
Total......	480	100.	119	25.	144	30.
Feeding factor..........................				2.4		

Fly Protection and Type of Feeding

Table VII, Selected Nurses presents in similar fashion the data concerning fly protection and type of feeding combined. The figures are entirely consistent with the conclusions drawn from the data as studied separately. It is unfortunate that the poor protection, artificial feeding group is so small, otherwise an interesting measurement of the importance of flies and artificial feeding could have been made by comparing the diarrheal rate with that of the good protection, breast fed group.

Dirty Homes and Artificial Feeding Factor

The smallest group used in determining a factor has been in the group of artificially fed infants in dirty homes where 9 infants with a diarrheal rate of 56% have been compared with 55 breast fed infants in clean homes, with a diarrheal rate of 16%, giving a factor of 3.5. A measurement based upon so few cases is not of course of great value, particularly when the very considerable influence of poor fly protection is not discounted. If the artificially fed infants in dirty homes under poor protection are eliminated the factor is reduced to 2.7. The artificial feeding factors show a gradual increase as the three degrees of protection are considered; viz. 2.2 for good, 2.5 for fair, and 2.8 for poor protection, with an average for the three degrees of protection of 2.4.

TABLE VIII.—SELECTED NURSES.

FLY PROTECTION.

ACCORDING TO AGE.

Good Protection.

	Total No. Infants.	% Distri. Infants.	Inf. Attack. by Diar.		Attacks of Diar.	
			No.	%	No.	%
0—3 Months..	91	36.	15	17.	17	19.
4—6 “ ..	60	24.	13	22.	16	27.
7—9 “ ..	64	25.	16	25.	20	31.
10—12 “ ..	39	15.	13	33.	13	33.
Total......	254	100.	57	22.	66	26.

Fair Protection.

	Total No. Infants.	% Distri. Infants.	Inf. Attack. by Diar.		Attacks of Diar.	
			No.	%	No.	%
0—3 Months..	54	29.	12	22.	15	28.
4—6 “ ..	49	27.	13	27.	17	35.
7—9 “ ..	39	21.	9	23.	11	28.
10—12 “ ..	43	23.	11	26.	13	30.
Total......	185	100.	45	24.	56	30.

Poor Protection.

	Total No. Infants.	% Distri. Infants.	Inf. Attack. by Diar.		Attacks of Diar.	
			No.	%	No.	%
0—3 Months..	6	15.	2	33.	2	33.
4—6 “ ..	11	27.	4	36.	4	37.
7—9 “ ..	15	36.	7	47.	10	67.
10—12 “ ..	9	22.	4	44.	6	67.
Total......	41	100.	17	41.	22	54.

Good, Fair and Poor Protection.

	Total No. Infants.	% Distri. Infants.	Inf. Attack. by Diar.		Attacks of Diar.	
			No.	%	No.	%
0—3 Months..	151	32.	29	19.	34	23.
4—6 “ ..	120	25.	30	25.	37	31.
7—9 “ ..	118	24.	32	27.	41	35.
10—12 “ ..	91	19.	28	31.	32	35.
Total......	480	100.	119	25.	144	30.

Fly Protection and Age

In Table VIII, Selected Nurses, showing fly protection according to age, the general tendency for the diarrheal rate to increase as the age increases and the fly protection decreases is clearly seen, although the increase is by no means entirely consistent. The 0—3 group has the lowest diarrheal rate in every instance, and the 10—12 group is consistently high. Here, as described on page 23, the decrease in breast feeding with its low rate, and the increase in artificial feeding with its high rate, explains to some extent the higher rates in the older age groups. The question of age influence is, however, especially subtle. Before trustworthy conclusions can be drawn many influences should be carefully considered. The nature of the experiment, however, does not permit of such detailed analysis.

TABLE IX.—SELECTED NURSES.

FLY PROTECTION.

ACCORDING TO NATIONALITY.

Good Protection.

	Total No. Infants.	% Distri. Infants.	Inf. Attack. by Diar.		Attacks of Diar.	
			No.	%	No.	%
American	8	3.	3	38.	3	38.
Austrian	7	3.	—	—	—	—
Irish	6	2.	3	50.	3	50.
Italian	132	52.	19	14.	21	16.
Jew	83	33.	27	33.	33	40.
Polish	6	2.	5	83.	6	100.
4 Other Nation.	12	5.	—	—	—	—
Total......	264	100.	57	22.	66	26.

Fair Protection.

	Total No. Infants.	% Distri. Infants.	Inf. Attack. by Diar.		Attacks of Diar.	
			No.	%	No.	%
American	5	3.	1	20.	1	20.
Austrian	6	3.	2	33.	3	50.
Irish	10	6.	—	—	—	—
Italian	46	25.	6	13.	8	17.
Jew	111	60.	35	32.	43	39.
Polish	3	2.	—	—	—	—
4 Other Nation.	4	2.	1	25.	1	25.
Total......	185	100.	45	24.	56	30.

Poor Protection.

	Total No. Infants.	% Distri. Infants.	Inf. Attack. by Diar.		Attacks of Diar.	
			No.	%	No.	%
American	—	—	—	—	—	—
Austrian	1	2.	1	100.	2	200.
Irish	—	—	—	—	—	—
Italian	4	10.	2	50.	2	50
Jew	34	84.	13	38.	17	50.
Polish	1	2.	1	100.	1	100.
4 Other Nation.	1	2.	—	—	—	—
Total......	41	100.	17	41.	22	54.

Good, Fair and Poor Protection.

	Total No. Infants.	% Distri. Infants.	Inf. Attack. by Diar. No.	Inf. Attack. by Diar. %	Attacks of Diar. No.	Attacks of Diar. %
American	13	3.	4	31.	4	31.
Austrian	14	3.	3	21.	5	36.
Irish	16	3.	3	19.	3	19.
Italian	182	38.	27	15.	31	17.
Jew	228	48.	75	33.	93	41.
Polish	10	2.	6	60.	7	70.
4 Other Nation.	17	3.	1	6.	1	6.
Total......	480	100.	119	25.	144	30.

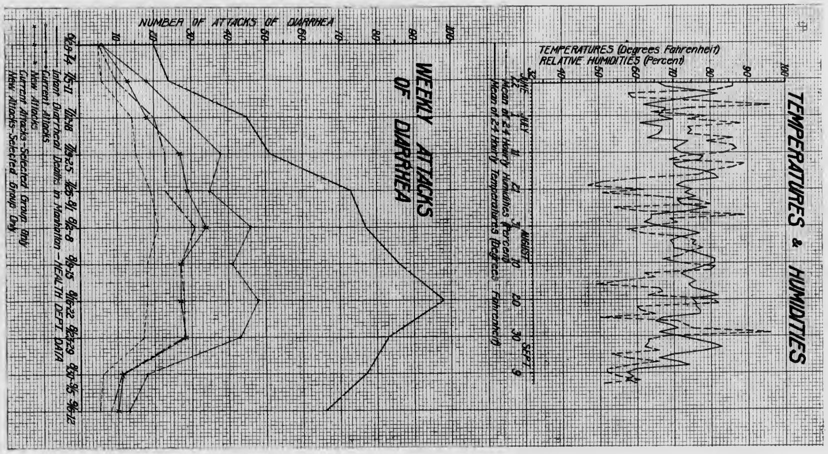
Fly Protection and Nationality

Owing to the smallness of the groups, the method of classification and the many complicating factors, conclusions of much value cannot be drawn from the nationality tables. In Table IX, Selected Nurses, one reason for the higher diarrheal rates of the Jewish may be seen. Fifteen per cent. of the Jewish had poor fly protection and only 2% of the Italians. Another reason, not shown in the table, is the greater number of Jewish in dirty homes; over twice as many were in the dirty homes as was the case with the Italians.

Daily Temperatures and Humidities

Table X, Selected Nurses, shows the average weekly mean temperatures and relative humidities, the deaths from diarrhea of infants in Manhattan, the number of new attacks of diarrhea occurring each week among the four age groups of the study, and the number of new attacks plus the continued attacks which existed each week. While there seems to be a certain association between the two weeks of greatest number of diarrheal deaths and the two weeks of highest temperature and humidity, the week of highest new and current attacks is not associated with a week of particular oppressiveness. The summer was not one of exceptional hot spells, and the occasional hot days do not influence markedly the weekly averages. Three weeks reached an average of 77° Fahr., with humidities of 76, 73 and 67%. September 6—12 was the coldest week, with 62° Fahr. and 57% humidity.

The chart opposite page 31 shows the daily mean temperature and humidity, and gives consequently a graphic picture of the exact conditions met with during the summer.



CLIMATIC CONDITIONS AND DIARRHEAL ATTACKS

TABLE X.—SELECTED NURSES.

Attacks of Diarrhea by Weeks and by Age Groups.

Age	June 22-27	June-July 28-4	July 5-11	July 12-18	July 19-25	July-Aug. 26-1	Aug. 2-8	Aug. 9-15	Aug. 16-22	Aug. 23-29	Aug.-Sep. 30-5	Sep. 6-12	Total
0—3 Months....		3	2	7	2	4	3	3	5	3	2	0	34
4—6 "		0	1	3	4	5	6	5	3	6	3	1	37
7—9 "		0	2	2	2	6	8	7	6	5	1	2	41
10—12 "		2	1	2	7	4	4	3	4	3	0	2	32
Total......		5	6	14	15	19	21	18	18	17	6	5	144

Total Current Attacks* of Diarrhea by Weeks and by Age Groups.

Age	June 22-27	June-July 28-4	July 5-11	July 12-18	July 19-25	July-Aug. 26-1	Aug. 2-8	Aug. 9-15	Aug. 16-22	Aug. 23-29	Aug.-Sep. 30-5	Sep. 6-12	Total
0—3 Months....		3	4	10	8	6	6	5	10	7	4	1	64
4—6 "		—	1	4	5	6	11	8	5	8	3	2	53
7—9 "		—	2	3	3	7	9	10	8	8	3	3	56
10—12 "		2	3	3	7	4	5	4	5	5	1	2	41
Total......		5	10	20	23	23	31	27	28	28	11	8	214

*Obtained by adding the new attacks to the attacks continued from the preceeding week.

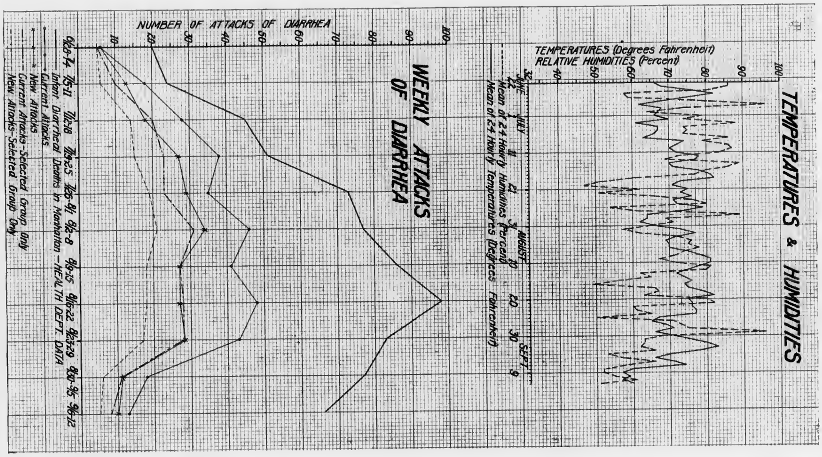
Temperatures and Relative Humidities by Weeks.

	June 22-27	June-July 28-4	July 5-11	July 12-18	July 19-25	July-Aug. 26-1	Aug. 2-8	Aug. 9-15	Aug. 16-22	Aug. 23-29	Aug.-Sep. 30-5	Sep. 6-12
Aver. Daily Mean Temp, Deg. Fahr.	73	66	69	77	73	69	73	77	77	70	75	62
Aver. Daily Mean Rel. Hum. in %	75	78	82	76	62	67	73	69	67	70	62	57

Deaths from Diarrhea of Infants under one year of age in Manhattan during summer of 1914.

June 22-27	June-July 28-4	July 5-11	July 12-18	July 19-25	July-Aug. 26-1	Aug. 2-8	Aug. 9-15	Aug. 16-22	Aug. 23-29	Aug.-Sep. 30-5	Sep. 6-12
17	20	24	45	51	73	77	86	98	83	77	66

INTENTIONAL SECOND EXPOSURE



CLIMATIC CONDITIONS AND DIARRHEAL ATTACKS

TABLE X.—SELECTED NURSES.

Attacks of Diarrhea by Weeks and by Age Groups.

Age	June 22-27	June-July 28-4	July 5-11	July 12-18	July 19-25	July-Aug. 26-1	Aug. 2-8	Aug. 9-15	Aug. 16-22	Aug. 23-29	Aug.-Sep. 30-5	Sep. 6-12	Total
0—3 Months....		3	2	7	2	4	3	3	5	3	2	0	34
4—6 "		0	1	3	4	5	6	5	3	6	3	1	37
7—9 "		0	2	2	2	6	8	7	6	5	1	2	41
10—12 "		2	1	2	7	4	4	3	4	3	0	2	32
Total......		5	6	14	15	19	21	18	18	17	6	5	144

Total Current Attacks* of Diarrhea by Weeks and by Age Groups.

Age	June 22-27	June-July 28-4	July 5-11	July 12-18	July 19-25	July-Aug. 26-1	Aug. 2-8	Aug. 9-15	Aug. 16-22	Aug. 23-29	Aug.-Sep. 30-5	Sep. 6-12	Total
0—3 Months....		3	4	10	8	6	6	5	10	7	4	1	64
4—6 "		—	1	4	5	6	11	8	5	8	3	2	53
7—9 "		—	2	3	3	7	9	10	8	8	3	3	56
10—12 "		2	3	3	7	4	5	4	5	5	1	2	41
Total......		5	10	20	23	23	31	27	28	28	11	8	214

*Obtained by adding the new attacks to the attacks continued from the preceeding week.

Temperatures and Relative Humidities by Weeks.

	June 22-27	June-July 28-4	July 5-11	July 12-18	July 19-25	July-Aug. 26-1	Aug. 2-8	Aug. 9-15	Aug. 16-22	Aug. 23-29	Aug.-Sep. 30-5	Sep. 6-12
Aver. Daily Mean Temp. Deg. Fahr.	73	66	69	77	73	69	73	77	77	70	75	62
Aver. Daily Mean Rel. Hum. in %	75	78	82	76	62	67	73	69	67	70	62	57

Deaths from Diarrhea of Infants under one year of age in Manhattan during summer of 1914.

June 22-27	June-July 28-4	July 5-11	July 12-18	July 19-25	July-Aug. 26-1	Aug. 2-8	Aug. 9-15	Aug. 16-22	Aug. 23-29	Aug.-Sep. 30-5	Sep. 6-12
17	20	24	45	51	73	77	86	98	83	77	66

Discussion of Diarrheal Rates of Combined Selected and Non-selected Groups.

Fly Protection

It will be noted from Table I, Selected and Non-selected Nurses, on page 41, that the fly factor for the combined group, obtained by dividing 31% by 22%, is 1.4, in contrast to that of the selected group alone, which is 1.9. This is the widest variation which occurs between the selected and the combined groups, and is owing to the low diarrheal rate (23%) for the non-selected, poor protection group which in turn may be accounted for by the unexpectedly low rates that obtain in the poorly protected, dirty homes and the poorly protected, artificially fed groups of the non-selected nurses. Among the non-selected nurses for instance, none of the 5 infants in the poorly protected, artificially fed group were recorded as having diarrhea. Viewed in the light of the diarrheal rates found elsewhere in the report it is hardly possible to consider such rates as representative, and as stated on page 19, the factor of the selected nurses is accepted as more reliable.

Condition of Home

The combined group shows a "dirt" factor of 1.9, practically the same as that for the selected group (1.8), although the actual rates for the clean, fair, dirty, and unclassified groups are in every instance considerably lower. It is interesting to note here that the lowest rates that occur anywhere in the experiment in the clean homes group. The chief reason for this appears to be the negligible influence of poor protection on the group. Among the 204 clean homes only 4 fall in the poor protection group. Artificial feeding enters into both the clean and dirty groups in about the same degree, and consequently does not influence the factor appreciably.

Type of Feeding

The artificial feeding factors for the selected and the combined groups are the same, namely, 2.4, in spite of a marked variation in the actual diarrheal rates. The influence of poor protection and dirty homes in determining the artificial feeding factor is of no practical importance.

Age

The same tendency for increasing rates with advancing age is noticed, although much less markedly, in the combined group. While the temptation to subject these figures to further analysis and to determine the underlying causes is great, it is felt that such analysis would be of doubtful value.

Nationality

In the four nationality groups of sufficient sizes for comparative purposes, the American, Irish and Italian infants seem to have a marked advantage over the Jewish infants, in regard to the prevalence of diarrhea. This may be accounted for in part by the fact that while only 2% of the Jewish were in clean homes, between 23% and 30% of the other three nationalities were similarly housed. Conversely, a larger percentage of the Jewish were in dirty homes.

Flies and "Dirt"

The flies and "dirt" factor obtained by comparing the diarrheal rates of poorly protected infants in dirty homes with that of the well-protected infants in clean homes, is lowered from 2.4 to 2.1 for the combined group of nurses.

Artificial Feeding and "Dirt'

The artificial feeding and "dirt" factor, obtained by comparing the diarrheal rates of artificially fed infants in dirty homes, with that of the breast fed infants in clean homes, remains unchanged at 3.5.

The following table gives the five main factors as obtained by the selected nurses and the combined nurses:

	Fly Factor	"Dirt" Factor	Art. Feed Factor	Fly & "Dirt" Factor	Art.Feed "Dirt" Factor
Selected Nurses..	1.9	1.8	2.4	2.4	3.5
All Nurses........	1.4	1.9	2.4	2.1	3.5

MODIFIED CONCLUSIONS.

The Conclusions are based on the work of all the Nurses.

While acknowledging that the reliability and accuracy of the work of the non-selected nurses is considerably less than that of the selected nurses, the Bureau after due consideration decided that sufficient value was attached to the work of the non-selected nurses to justify its inclusion with that of the selected nurses, especially in view of the fact that by so doing the conclusions drawn from the combined work would be based upon twice the number of infants.

The modified conclusions of the study based upon the 921 infants under observation from June 9 to September 15 differ from those based upon the 480 infants under the selected nurses in only one important particular, namely, the relative importance of flies as compared with that of "dirt". While the position of the Bureau as stated on page 19 accepts the factor (1.9) of the selected nurses as more reliable, and attributes approximately equal importance to flies and "dirt", the fly factor of the combined nurses (1.4) places the relative importance of flies somewhat below that of "dirt".

Fly Factor 1.4

Almost one and a half times as many infants (1.4) had diarrhea among fly-exposed as among fly-protected infants.

"Dirt" Factor 1.9

The group of influences associated with a dirty home and designated as the "dirt" factor, play a more important part in diarrheal incidence among infants. Almost twice as many infants (1.9) had diarrhea in dirty homes as in clean homes.

Artificial Feeding Factor 2.4

Of somewhat greater importance is the influence of artificial feeding. Almost two and a half times as many infants (2.4) were attacked by diarrhea among the artificially fed as among the breast fed infants.

Flies and "Dirt" Factor 2.1

The influence of flies and "dirt" combined is of only slightly less importance than artificial feeding. About twice as many fly-exposed infants (2.1) in dirty homes were attacked by diarrhea as fly-protected infants in clean homes.

"Dirt" and Artificial Feeding Factor 3.5

The influence of "dirt" and artificial feeding combined is still greater. Three and a half times as many artificially fed infants (3.5) in dirty homes were attacked by diarrhea as breast fed infants in clean homes.

TABLE I.

NON-SELECTED NURSES.

FLY PROTECTION.

	Total No. Infants.	% Distri. Infants.	Inf. Attack. by Diar.		Attacks of Diar.	
			No.	%	No.	%
Good Protection	162	37.	33	20.	43	27.
Fair Protection	227	51.	25	11.	30	13.
Poor Protection	52	12.	12	23.	13	25.
Total......	441	100.	70	16.	86	20.
Fly factor...............................				1.2		

TABLE II.

CONDITION OF HOME.

Clean	126	29.	15	12.	20	16.
Fair	121	27.	19	18.	22	18.
Dirty	59	13.	11	19.	13	22.
Unclassified	135	31.	25	19.	31	23.
Total......	441	100.	70	16.	86	20.
"Dirt" factor.............................				1.6		

TABLE III.

TYPE OF FEEDING.

Breast	303	69.	38	13.	41	14.
Mixed	81	18.	14	17.	18	22.
Artificial	57	13.	18	32.	27	47.
Total......	441	100.	70	16.	86	20.
Feeding factor...........................				2.5		

TABLE IV.

AGE.

0—3 Months..	128	29.	18	14.	22	17.
4—6 " ..	112	25.	20	18.	27	33.
7—9 " ..	122	28.	18	15.	21	17.
10—12 " ..	79	18.	14	18.	16	20.
Total......	441	100.	70	16.	86	20.
Age factor..............................				1.2		

TABLE V.

NATIONALITY.

(Grouped according to mother's.)

American	112	25.	12	11.	12	11.
German	18	4.	3	17.	6	33.
Irish	84	19.	11	13.	14	17.
Italian	101	23.	15	15.	18	18.
Jew	80	18.	20	25.	25	31.
12 other Nation.	46	11.	9	20.	11	24.
Total......	441	100.	70	16.	86	20.

TABLE VI. -

NON-SELECTED NURSES.

FLY PROTECTION.

ACCORDING TO CONDITION OF HOME.

Good Protection.

	Total No. Infants.	% Distri. Infants.	Inf. Attack. by Diar.		Attacks of Diar.	
			No.	%	No.	%
Clean	70	43.	9	13.	11	16.
Fair	48	30.	10	21.	13	27.
Dirty	11	7.	3	27.	3	27.
Unclassified	33	20.	11	33.	16	49.
Total......	162	100.	33	20.	43	27.

"Dirt" factor............................ 2.1

Fair Protection.

	Total No. Infants.	% Distri. Infants.	Inf. Attack. by Diar.		Attacks of Diar.	
			No.	%	No.	%
Clean	53	23.	5	9.	8	15.
Fair	60	27.	7	12.	7	12.
Dirty	25	11.	3	12.	4	16.
Unclassified	89	39.	10	11.	11	12.
Total......	227	100.	25	11.	30	13.

"Dirt" factor............................ 1.3

Poor Protection.

	Total No. Infants.	% Distri. Infants.	Inf. Attack. by Diar.		Attacks of Diar.	
			No.	%	No.	%
Clean	3	6.	1	33.	1	33.
Fair	13	25.	2	15.	2	15.
Dirty	23	44.	5	22.	6	26.
Unclassified	13	25.	4	31.	4	31.
Total......	52	100.	12	23.	13	25.

"Dirt" factor............................ 0.7

Good, Fair and Poor Protection.

	Total No. Infants.	% Distri. Infants.	Inf. Attack. by Diar.		Attacks of Diar.	
			No.	%	No.	%
Clean	126	29.	15	12.	20	16.
Fair	121	27.	19	18.	22	18.
Dirty	59	13.	11	19.	13	22.
Unclassified	135	31.	25	19.	31	23.
Total......	441	100.	70	16.	86	20.

"Dirt" factor............................ 1.6

TABLE VII.

NON-SELECTED NURSES.

FLY PROTECTION.

ACCORDING TO TYPE OF FEEDING.

Good Protection.

	Total No. Infants.	% Distri. Infants.	Inf. Attack. by Diar.		Attacks of Diar.	
			No.	%	No.	%
Breast Fed.....	102	63.	13	12.	14	14.
Mixed Fed.....	33	20.	9	27.	13	39.
Artificially Fed.	27	17.	11	41.	16	59.
Total......	162	100.	33	20.	43	27.

Feeding factor.......................... 3.4

Fair Protection.

	Total No. Infants.	% Distri. Infants.	Inf. Attack. by Diar.		Attacks of Diar.	
			No.	%	No.	%
Breast Fed.....	167	74.	16	10.	17	10.
Mixed Fed.....	35	15.	2	6.	2	6.
Artificially Fed.	25	11.	7	28.	11	44.
Total......	227	100.	25	11.	30	13.

Feeding factor.......................... 2.8

Poor Protection.

	Total No. Infants.	% Distri. Infants.	Inf. Attack. by Diar.		Attacks of Diar.	
			No.	%	No.	%
Breast Fed.....	34	65.	9	26.	10	29.
Mixed Fed.....	13	25.	3	23.	3	23.
Artificially Fed.	5	10.	—	—	—	—
Total......	52	100.	12	23.	13	25.

Feeding factor..........................

Good, Fair and Poor Protection.

	Total No. Infants.	% Distri. Infants.	Inf. Attack. by Diar.		Attacks of Diar.	
			No.	%	No.	%
Breast Fed.....	303	69.	38	13.	41	14.
Mixed Fed... .	81	18.	14	17.	18	22.
Artificially Fed.	57	13.	18	32.	27	47.
Total......	441	100.	70	16.	86	20.

Feeding factor.......................... 2.5

TABLE VIII.

NON-SELECTED NURSES.

FLY PROTECTION.

ACCORDING TO AGE.

Good Protection.

	Total No. Infants.	% Distri. Infants.	Inf. Attack. by Diar.		Attacks of Diar.	
			No.	%	No.	%
0—3 Months..	53	33.	12	23.	16	30.
4—6 “ ..	38	24.	11	29.	15	40.
7—9 “ ..	46	28.	6	13.	8	17.
10—12 “ ..	25	15.	4	16.	4	16.
Total......	162	100.	33	20.	43	27.

Fair Protection.

0—3 Months..	59	26.	4	7.	4	7.
4—6 “ ..	67	30.	6	9.	9	13.
7—9 “ ..	62	27.	8	13.	8	13.
10—12 “ ..	39	17.	7	18.	9	23.
Total......	227	100.	25	11.	30	13.

Poor Protection.

0—3 Months..	16	31.	2	13.	2	13.
4—6 “ ..	7	13.	3	43.	3	43.
7—9 “ ..	14	27.	4	29.	5	36.
10—12 “ ..	15	29.	3	20.	3	20.
Total......	52	100.	12	23.	13	25.

Good, Fair and Poor Protection.

0—3 Months..	128	29.	18	14.	22	17.
4—6 “ ..	112	25.	20	18.	27	24.
7—9 “ ..	122	28.	18	15.	21	17.
10—12 “ ..	79	18.	14	18.	16	20.
Total......	441	100.	70	16.	86	20.

TABLE IX.

NON-SELECTED NURSES.

FLY PROTECTION.

ACCORDING TO NATIONALITY.

Good Protection.

	Total No. Infants.	% Distri. Infants.	Inf. Attack. by Diar.		Attacks of Diar.	
			No.	%	No.	%
American	32	20.	5	16.	5	16.
German	10	6.	1	10.	1	10.
Irish	34	21.	5	15.	6	18.
Italian	44	27.	8	18.	11	25.
Jew	27	17.	10	37.	14	52.
12 other Nation.	15	9.	4	27.	6	40.
Total......	162	100.	33	20.	43	27.

Fair Protection.

American	72	32.	7	10.	7	10.
German	7	3.	1	14.	3	43.
Irish	47	21.	6	13.	8	17.
Italian	43	19.	3	7.	3	7.
Jew	32	14.	6	19.	7	22.
12 other Nation.	26	11.	2	8.	2	8.
Total......	227	100.	25	11.	30	13.

Poor Protection.

American	8	15.	—	—	—	—
German	1	2.	1	100.	2	200.
Irish	3	6.	—	—	—	—
Italian	14	27.	4	29.	4	29.
Jew	21	40.	4	19.	4	19.
12 other Nation.	5	10.	3	60.	3	60.
Total......	52	100.	12	23.	13	25.

Good, Fair and Poor Protection.

American	112	25.	12	11.	12	11.
German	18	4.	3	17.	6	33.
Irish	84	19.	11	13.	14	17.
Italian	101	23.	15	15.	18	18.
Jew	80	18.	20	25.	25	31.
12 other Nation.	46	11.	9	20.	11	24.
Total......	441	100.	70	16.	86	20.

TABLE X.—NON-SELECTED NURSES.

Attacks of Diarrhea by Weeks and by Age Groups.

Age	June 22-27	June-July 28-4	July 5-11	July 12-18	July 19-25	July-Aug. 26-1	Aug. 2-8	Aug. 9-15	Aug. 16-22	Aug. 23-29	Aug.-Sep. 30-5	Sep. 6-12	Total
0—3 Months....		—	5	—	5	2	3	4	—	1	1	1	22
4—6 "		—	2	3	2	4	5	4	2	3	2	—	27
7—9 "		1	—	—	4	2	3	—	2	4	1	4	21
10—12 "		—	—	1	1	2	2	1	5	3	1	—	16
Total......		1	7	4	12	10	13	9	9	11	5	5	86

Total Current Attacks* of Diarrhea by Weeks and by Age Groups.

Age	June 22-27	June-July 28-4	July 5-11	July 12-18	July 19-25	July-Aug. 26-1	Aug. 2-8	Aug. 9-15	Aug. 16-22	Aug. 23-29	Aug.-Sep. 30-5	Sep. 6-12	Total
0—3 Months....		—	5	2	6	3	5	5	3	2	2	1	34
4—6 "		—	2	4	3	4	5	8	9	5	3	—	43
7—9 "		1	1	1	5	2	3	—	2	4	1	4	24
10—12 "		—	—	1	1	3	2	1	6	4	1	—	19
Total......		1	8	8	15	12	15	14	20	15	7	5	120

*Obtained by adding the new attacks to the attacks continued from the preceeding week.

Temperatures and Relative Humidities by Weeks.

	June 22-27	June-July 28-4	July 5-11	July 12-18	July 19-25	July-Aug. 26-1	Aug. 2-8	Aug. 9-15	Aug. 16-22	Aug. 23-29	Aug.-Sep. 30-5	Sep. 6-12
Aver. Daily Mean Temp, Deg. Fahr.	73	66	69	77	73	69	73	77	77	70	75	62
Aver. Daily Mean Rel. Hum. in %	75	78	82	76	62	67	73	69	67	70	62	57

Deaths from Diarrhea of Infants under one year of age in Manhattan during summer of 1914.

June 22-27	June-July 28-4	July 5-11	July 12-18	July 19-25	July-Aug. 26-1	Aug. 2-8	Aug. 9-15	Aug. 16-22	Aug. 23-29	Aug.-Sep. 30-5	Sep. 6-12
17	20	24	45	51	73	77	86	98	83	77	66

TABLE I.

Combined Selected and Non-Selected Nurses.

FLY PROTECTION.

	Total No. Infants.	% Distri. Infants.	Inf. Attack. by Diar. No.	%	Attacks of Diar. No.	%
Good Protection	416	45.	90	22.	109	26.
Fair Protection	412	45.	70	17.	86	21.
Poor Protection	93	10.	29	31.	35	38.
Total......	921	100.	189	21.	230	25.
Fly factor..................................				1.4		

TABLE II.

CONDITION OF HOME.

Clean	204	22.	29	14.	36	18.
Fair	220	24.	45	20.	56	25.
Dirty	131	14.	34	26.	40	31.
Unclassified	366	40.	81	22.	98	27.
Total......	921	100.	189	21.	230	25.
"Dirt" factor..............................				1.9		

TABLE III.

TYPE OF FEEDING.

Breast	636	69.	108	17.	126	20.
Mixed	182	20.	40	22.	50	27.
Artificial	103	11.	41	40.	54	52.
Total......	921	100.	189	21.	230	25.
Feeding factor............................				2.4		

TABLE IV.

AGE.

0—3 Months..	279	30.	47	17.	56	20.
4—6 " ..	232	25.	50	22.	64	28.
7—9 " ..	240	26.	50	21.	62	26.
10—12 " ..	170	19.	42	25.	48	28.
Total......	921	100.	189	21.	230	25.
Age factor..................................				1.5		

TABLE V.

NATIONALITY.

American	125	13.	16	13.	16	13.
Austrian	19	2.	5	26.	6	32.
German	25	3.	3	12.	6	24.
Irish	100	11.	14	14.	17	17.
Italian	283	31.	42	15.	49	17.
Jew	308	33.	95	31.	118	38.
12 other Nation.	61	7.	14	23.	18	30.
Total......	921	100.	189	21.	230	25.

TABLE VI.

Combined Selected and Non-Selected Nurses.

FLY PROTECTION.

ACCORDING TO CONDITION OF HOME.

Good Protection.

	Total No. Infants.	% Distri. Infants.	Inf. Attack. by Diar.		Attacks of Diar.	
			No.	%	No.	%
Clean	125	30.	19	15.	21	17.
Fair	103	25.	23	22.	30	29.
Dirty	39	9.	10	26.	10	26.
Unclassified	149	36.	38	26.	48	32.
Total......	416	100.	90	22.	109	26.
"Dirt" factor............................				1.7		

Fair Protection.

Clean	75	18.	9	12.	14	19.
Fair	99	24.	18	18.	21	21.
Dirty	51	12.	11	22.	13	26.
Unclassified	187	46.	32	17.	38	20.
Total......	412	100.	70	17.	86	21.
"Dirt" factor............................				1.8		

Poor Protection.

Clean	4	4.	1	25.	1	25.
Fair	18	19.	4	22.	5	28.
Dirty	41	44.	13	32.	17	41.
Unclassified	30	33.	11	37.	12	40.
Total......	93	100.	29	31.	35	38.
"Dirt" factor............................				1.3		

Good, Fair and Poor Protection.

Clean	204	22.	29	14.	36	18.
Fair	220	24.	45	20.	56	25.
Dirty	131	14.	34	26.	40	31.
Unclassified	366	40.	81	22.	98	27.
Total......	921	100.	189	21.	230	25.
"Dirt" factor............................				1.9		

TABLE VII.

Combined Selected and Non-Selected Nurses.

FLY PROTECTION.

ACCORDING TO TYPE OF FEEDING.

Good Protection.

	Total No. Infants.	% Distri. Infants.	Inf. Attack. by Diar.		Attacks of Diar.	
			No.	%	No.	%
Breast Fed.....	282	68.	49	17.	57	20.
Mixed Fed.....	84	20.	20	24.	24	29.
Artificially Fed.	50	12.	21	42.	28	56.
Total......	416	100.	90	22.	109	26.
Feeding factor..........................				2.5		

Fair Protection.

Breast Fed.....	298	72.	42	14.	48	16.
Mixed Fed.....	69	17.	11	16.	15	22.
Artificially Fed.	45	11.	17	38.	23	51.
Total......	412	100.	70	17.	86	21.
Feeding factor..........................				2.7		

Poor Protection.

Breast Fed.....	56	60.	17	30.	21	38.
Mixed Fed.....	29	31.	9	31.	11	38.
Artificially Fed.	8	9.	3	38.	3	38.
Total......	93	100.	29	31.	35	38.
Feeding factor..........................				1.3		

Good, Fair and Poor Protection.

Breast Fed.....	636	69.	108	17.	126	20.
Mixed Fed.....	182	20.	40	22.	50	28.
Artificially Fed.	103	11.	41	40.	54	52.
Total......	921	100.	189	21.	230	25.
Feeding factor..........................				2.4		

TABLE VIII.

Combined Selected and Non-Selected Nurses.

FLY PROTECTION.

ACCORDING TO AGE.

Good Protection.

	Total No. Infants.	% Distri. Infants.	Inf. Attack. by Diar.		Attacks of Diar.	
			No.	%	No.	%
0—3 Months..	144	35.	27	19.	33	23.
4—6 “ ..	98	24.	24	25.	31	32.
7—9 “ ..	110	26.	22	20.	28	25.
10—12 “ ..	64	15.	17	27.	17	27.
Total......	416	100.	90	22.	109	26.

Fair Protection.

0—3 Months..	113	27.	16	14.	19	17.
4—6 “ ..	116	28.	19	16.	26	22.
7—9 “ ..	101	25.	17	17.	19	19.
10—12 “ ..	82	20.	18	22.	22	27.
Total......	412	100.	70	17.	86	21.

Poor Protection.

0—3 Months..	22	24.	4	18.	4	18.
4—6 “ ..	18	19.	7	39.	7	39.
7—9 “ ..	29	31.	11	38.	15	52.
10—12 “ ..	24	26.	7	29.	9	38.
Total......	93	100.	29	31.	35	38.

Good, Fair and Poor Protection.

0—3 Months..	279	30.	47	17.	56	20.
4—6 “ ..	232	25.	50	22.	64	28.
7—9 “ ..	240	26.	50	21.	62	26.
10—12 “ ..	170	19.	42	25.	48	28.
Total......	921	100.	189	21.	230	25.

TABLE IX.

Combined Selected and Non-Selected Nurses.

FLY PROTECTION.

ACCORDING TO NATIONALITY.

Good Protection.

	Total No. Infants.	% Distri. Infants.	Inf. Attack. by Diar.		Attacks of Diar.	
			No.	%	No.	%
American	40	10.	8	20.	8	20.
Austrian	8	2.	—	—	—	—
German	15	4.	1	7.	1	7.
Irish	40	10.	8	20.	9	23.
Italian	176	42.	27	15.	32	18.
Jew	110	26.	37	34.	47	43.
12 other Nation.	27	6.	9	33.	12	44.
Total......	416	100.	90	22.	109	26.

Fair Protection.

American	77	19.	8	10.	8	10.
Austrian	8	2.	2	25.	3	38.
German	8	2.	1	13.	3	38.
Irish	57	14.	6	11.	8	14.
Italian	89	21.	9	10.	11	12.
Jew	143	35.	41	29.	50	35.
12 other Nation.	30	7.	3	10.	3	10.
Total......	412	100.	70	17.	86	21.

Poor Protection.

American	8	9.	—	—	—	—
Austrian	3	3.	3	100.	3	100.
German	2	2.	1	50.	2	100.
Irish	3	3.	—	—	—	—
Italian	18	19.	6	33.	6	33.
Jew	55	60.	17	31.	21	38.
12 other Nation.	4	4.	2	50.	3	75.
Total......	93	100.	29	31.	35	38.

Good, Fair and Poor Protection.

American	125	13.	16	13.	16	13.
Austrian	19	2.	5	26.	6	32.
German	25	3.	3	12.	6	24.
Irish	100	11.	14	14.	17	17.
Italian	283	31.	42	15.	49	17.
Jew	308	33.	95	31.	118	38.
12 other Nation.	61	7.	14	23.	18	30.
Total......	921	100.	189	21.	230	25.

TABLE X.—COMBINED SELECTED AND NON-SELECTED NURSES.

Attacks of Diarrhea by Weeks and by Age Groups.

Age	June 22-27	June-July 28-4	July 5-11	July 12-18	July 19-25	July-Aug. 26-1	Aug. 2-8	Aug. 9-15	Aug. 16-22	Aug. 23-29	Aug.-Sep. 30-5	Sep. 6-12	Total
0—3 Months....		3	7	7	7	6	6	7	5	4	3	1	56
4—6 "		—	3	6	6	9	11	9	5	9	5	1	64
7—9 "		1	2	2	6	8	11	7	8	9	2	6	62
10—12 "		2	1	3	8	6	6	4	9	6	1	2	48
Total......		6	13	18	27	29	34	27	27	28	11	10	230

Total Current Attacks* of Diarrhea by Weeks and by Age Groups.

Age	June 22-27	June-July 28-4	July 5-11	July 12-18	July 19-25	July-Aug. 26-1	Aug. 2-8	Aug. 9-15	Aug. 16-22	Aug. 23-29	Aug.-Sep. 30-5	Sep. 6-12	Total
0—3 Months....		3	9	12	14	9	11	10	13	9	6	2	98
4—6 "		—	3	8	8	10	16	16	14	13	6	2	96
7—9 "		1	3	4	8	9	12	10	10	12	4	7	80
10—12 "		2	3	4	8	7	7	5	11	9	2	2	60
Total......		6	18	28	38	35	46	41	48	43	18	13	334

*Obtained by adding the new attacks to the attacks continued from the preceeding week.

Temperatures and Relative Humidities by Weeks.

	June 22-27	June-July 28-4	July 5-11	July 12-18	July 19-25	July-Aug. 26-1	Aug. 2-8	Aug. 9-15	Aug. 16-22	Aug. 23-29	Aug.-Sep. 30-5	Sep. 6-12
Aver. Daily Mean Temp, Deg. Fahr.	73	66	69	77	73	69	73	77	77	70	75	62
Aver. Daily Mean Rel. Hum. in %	75	78	82	76	62	67	73	69	67	70	62	57

Deaths from Diarrhea of Infants under one year of age in Manhattan during summer of 1914.

June 22-27	June-July 28-4	July 5-11	July 12-18	July 19-25	July-Aug. 26-1	Aug. 2-8	Aug. 9-15	Aug. 16-22	Aug. 23-29	Aug.-Sep. 30-5	Sep. 6-12
17	20	24	45	51	73	77	86	98	83	77	66

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END OF
TITLE